Chapter 27: Mitigation Summary

This chapter provides a summary of the mitigation measures developed to avoid, minimize, rectify, reduce, or compensate impacts from the Mountain View Corridor (MVC) alternatives. Funding for mitigation will be included in the cost of construction for the project with the Utah Department of Transportation (UDOT) having the final responsibility for implementation. UDOT or its designated contractor will implement a mitigation and monitoring tracking system to ensure that all mitigation identified in this Environmental Impact Statement is performed and that appropriate monitoring for effectiveness takes place. If a mitigation measure is determined to be not effective, the contractor will consult with UDOT to develop other appropriate mitigation.

27.1 Mitigation Measures for Land Use Impacts

No substantial impacts to land use are anticipated, so no mitigation measures are required.

27.2 Mitigation Measures for Farmland Impacts

Owners of farmland and farm-related businesses within the Mountain View Corridor right-of-way will be compensated according to the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, and other state and federal guidelines if the owners' properties are affected by project construction. For indirect impacts, UDOT, in coordination with the property owner, would determine, based on cost comparison, whether to restore access to the parcel or purchase the remainder of the farmland.

Any topsoil removed from areas of prime farmland and farmland of statewide importance will be scraped and stockpiled rather than covered over. The salvaged topsoil will be reapplied to disturbed slopes, seeded, and mulched or otherwise stabilized.

27.3 Mitigation Measures for Community Impacts

27.3.1 Community Cohesion

7200 West Freeway Alternative. The homes in a small area near 4100 South would be separated from other homes because they would be bordered by both the existing 7200 West and the 7200 West freeway. These homes would become isolated from the rest of the community. UDOT might be able to purchase all of these isolated homes under the provisions of the Utah Relocation Assistance Act. The individual residents and UDOT would jointly decide if these houses are purchased.

No other mitigation measures are proposed.

27.3.2 Quality of Life

All Alternatives. For areas currently that are developed with residential and commercial uses, UDOT will work with the affected communities to identify measures to lessen project-related impacts to quality of life. These measures might include noise barriers, special landscaping and lighting, and accessibility considerations (such as separated walkways). The responsibility for implementing these measures would be negotiated between the affected communities and UDOT during the final design phase of the project.

No other mitigation measures are proposed.

27.3.3 Recreation Resources

Any loss of land from recreation facilities due to the proposed alternatives would be compensated under the federal Uniform Relocation Assistance and Real Property Acquisition Policies Act for the loss of property and facilities. The following facilities are subject to property losses and compensation:

1. Lee Kay Center for Hunter Education (all Salt Lake County Alternatives)
2. Centennial Park (5600 West Transit Alternative)
3. Hunter Park (5800 West Freeway Alternative)
4. Jordan River Parkway Trail (Southern Freeway Alternative and Arterials Alternative)
5. North Lake Park (Southern Freeway Alternative)

Most impacts would be limited to undeveloped land only, with the exception of the Lee Kay Center for Hunter Education (relocation of an access road) and the Jordan River Parkway Trail (relocation of 1,500 feet of trail).

27.3.4 Community Facilities

Any loss of land from community facilities due to the proposed alternatives would be compensated under the federal Uniform Relocation Assistance and Real Property Acquisition Policies Act and the Utah Relocation Assistance Act for the loss of property and facilities, as appropriate. The following facilities are subject to property losses and compensation:

1. Fire stations in Salt Lake City, West Valley City, and West Jordan (5600 West Transit Alternative)
2. West Valley Family Fitness Center (5600 West Transit Alternative)
3. Hunter High School (5800 West Freeway Alternative)
4. Thomas Jefferson High School (5600 West Transit Alternative with Mixed-Traffic Transit Option)
5. West Hills Junior High School (5600 West Transit Alternative with Mixed-Traffic Transit Option)
6. Hillside Elementary School (5800 West Freeway Alternative)
7. Jehovah's Witness Meeting Hall (7200 West Freeway Alternative)
8. LDS Meeting House (Arterials Alternative)

27.3.5 Public Services and Utilities

All Alternatives. Most conflicts with utilities could be resolved through traditional means (such as relocating aboveground utility poles, placing the utility underground, or adjusting the height of utility poles to accommodate the roadway crossings). When a relocation or adjustment of the power lines is necessary for construction of the MVC, UDOT could, depending on the situation, acquire the right-of-way and pay the cost necessary to relocate the utilities.

For most pipeline conflicts, there are a number of possible mitigation measures. For the pipelines that are exposed but do not need realignment, the pipelines would be backfilled after construction is complete. If realignments are required in order to build the MVC, the affected pipeline(s) would be realigned within the utility corridor.

Final design details, final costs, or final agreements regarding relocations of either the PacifiCorp or MidAmerican Energy Holdings facilities located within the project area will be determined during the final design phase of the project. UDOT will enter into subsequent written agreements with PacifiCorp and MidAmerican Energy Holdings at a later date to address each conflict point.

27.3.6 Public Safety

All Alternatives. Proper access will be provided across the new facility near existing and future emergency access providers. UDOT will work with emergency personnel to remove obstacles in the roadway design that could hinder emergency response times. Additionally, if the freeway becomes a toll facility, emergency providers would not have to pay the toll.

27.3.7 Relocations

All Alternatives. Property acquisitions, both partial and total, will be completed according to federal guidelines and UDOT policies that include fair compensation measures for property owners. UDOT will comply with Title VI of the Civil Rights Act of 1964 and the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

Utah County Alternatives. Camp Williams will be compensated for impacts to property and facilities as follows:

1. Reimburse for actual incurred cost for design and relocation/construction of the ammunition supply point, aircraft operations building, aircraft control tower, and helicopter pads.
2. Include a grade-separated freeway crossing at Beef Hollow accessible to Camp Williams, and two access roads connecting the freeway crossing to existing roads on the west side of the alternatives servicing the western portions of Camp Williams.

Because training and facility requirements at Camp Williams could change, specific terms of the mitigation will be developed during the final design phase of the project prior to construction.

27.4 Mitigation Measures for Environmental Justice Impacts

Because no disproportionately high and adverse effects to environmental justice communities are anticipated from any of the proposed alternatives, no mitigation is required.

27.5 Mitigation Measures for Transportation Impacts

Although the MVC project might increase congestion on adjacent roads as a result of traffic entering or exiting the MVC, no mitigation measures are proposed.

27.6 Mitigation Measures for Economic Impacts

For impacts related to business displacements and relocations, this impacts analysis assumes that the relocation process used by UDOT would make any relocated businesses "whole," and so no mitigation would be required. For businesses that experience short-term access and visibility problems during construction, a traffic access management plan will be developed and implemented by the construction contractor that maintains the public's access to the business during normal business hours.

Mitigation is generally not offered to local governments that are adversely affected when lands are removed from their tax base. Over the long term, increased property values as a result of improved regional transportation access will generate enough revenue to offset the short-term impact to local government revenues.

For residential properties close to the roadway that experience adverse noise and aesthetic impacts and associated loss of property values, no mitigation is specifically recommended. However, the mitigation measures identified in Chapter 13, Noise, would partially mitigate these adverse impacts.

27.7 Mitigation Measures for Joint Development Impacts

No mitigation measures would be required.

27.8 Mitigation Measures for Impacts to Considerations Relating to Pedestrians and Bicyclists

Construction of any of the alternatives would disrupt bicyclists or pedestrians using the existing facilities. However, the impacts would be temporary because all crossings will be accommodated to maintain continuity and access after construction.

The design of the pedestrian and bicyclist accommodations will be determined during the final design phase of the project. Prior to final design, UDOT will coordinate with local municipalities, MAG, WFRC, and the Trails Advisory Board to ensure that all existing and planned facilities identified in the local and regional plans are accommodated. Options for accommodations include constructing at-grade crossings, routing the facility under the MVC roadway, or routing the facility over the MVC roadway.

27.9 Mitigation Measures for Air Quality Impacts

The regional air quality evaluations prepared by WFRC for Salt Lake County and MAG for Utah County concluded that, in 2030, the region would be in compliance with the emission budgets in the State Implementation Plans (see Section 12.4.1.1, Mesoscale Evaluations for Regional Air Quality). If all regionally significant projects included in UDOT's regional transportation plan (including the Mountain View Corridor) are constructed, the NAAQS for CO and PM_{10} would not be exceeded in Salt Lake County and Utah County (these areas are non-attainment or maintenance areas for CO and/or PM_{10}).

Microscale (hot-spot) modeling was performed at the project level for CO in the Salt Lake City maintenance area and at the highest-volume interchange in the impact analysis area. This modeling found that the MVC would not cause the NAAQS for CO to be exceeded. Similarly, a qualitative evaluation of PM_{10} concluded that the MVC would not cause the NAAQS for PM_{10} to be exceeded.

Emission inventory modeling was conducted for MSATs. This modeling found that the total emissions in the air quality impact analysis area would improve over existing conditions due to technological improvements in the future.

As a result, FHWA and UDOT conclude that the proposed Mountain View Corridor project would not have a substantial impact on regional air quality, so no mitigation measures are proposed. For construction-related air quality mitigation, see Section 27.18.1, Air Quality Mitigation.

27.10 Mitigation Measures for Noise Impacts

Because there would be no moderate or severe impacts from the 5600 West Transit Alternative, no mitigation would be required for this alternative. The noise mitigation measures discussed below focus on the roadway alternatives.

27.10.1 Noise-Abatement Criteria

This section discusses methods for abating the operational traffic noise impacts identified in Section 13.5, Environmental Consequences. Because there were no transit noise impacts, noise abatement is not considered for the 5600 West Transit Alternative.

According to the UDOT Noise-Abatement Policy (UDOT 08A2-1), noise abatement will be considered for new highway construction where noise impacts are identified. The goal of noise abatement is to substantially reduce noise, which might or might not result in noise levels below the NAC.

The two relevant criteria to consider when identifying and evaluating noise-abatement measures are feasibility and reasonableness. Noise abatement will be provided by UDOT only if UDOT determines that noise-abatement measures are *both* feasible and reasonable.

27.10.1.1 Feasibility

Noise-abatement feasibility deals primarily with construction and engineering considerations. (For example, can a substantial noise reduction be achieved at a specific location? Is noise abatement limited by factors such as topography, access requirements, the presence of local cross streets, or other noise sources in the area?)

Under UDOT's policy, a noise barrier (or other noise-abatement measure) that will not achieve at least 5 dBA of noise reduction at a majority of the first-row residences is not considered feasible. For the barrier analysis discussed below, a noise barrier could be either an earthen berm or a structural barrier (for example, a concrete wall). With enough right-of-way between the edge of the road and the nearest homes, an earthen berm that blocks the line of sight to affected residences can be an effective noise barrier and can be more aesthetically pleasing to nearby residents. The type of barrier used for the MVC will be determined during the final design phase of the project.

27.10.1.2 Reasonableness

Reasonableness is a more subjective criterion than feasibility. Reasonableness suggests that common sense and good judgment have been applied in arriving at a decision to recommend a noise-abatement measure. (For example, does the noise-abatement measure satisfy the cost criterion established by the noise policy?) As a result, a noise barrier could be feasible (that is, provide the minimum required 5 dBA of noise reduction at a majority of the first-row residences), but not be reasonable (for example, by not meeting UDOT's cost criterion).

27.10.2 Feasibility and Reasonableness Factors

UDOT considers the following factors, among others, when determining the feasibility and reasonableness of noise-abatement measures:

- **Noise-Abatement Benefits.** UDOT will make reasonable efforts to substantially reduce noise. UDOT defines a substantial noise reduction as a 10-dBA noise reduction at one first-row residence adjacent to the proposed alignment. Under UDOT's noise policy, noise barriers are considered feasible if at least 5 dBA of noise reduction can be achieved at the majority of first-row residences.
- **Land Use and Zoning.** The existing zoning and land uses adjacent to the MVC will be reviewed. In general, noise barriers are not consistent with commercial or industrial zoning because businesses usually attract customers by being visible to drivers on the roadway.
- **Engineering, Safety, and Maintenance.** Engineering, safety, and maintenance issues must be considered to determine the constructability of a noise-abatement measure. If any of these issues are substantial enough to preclude good safety and maintenance practices, then the barrier might not be feasible.
- **Cost of Abatement.** In residential areas, UDOT must consider all benefited residences when determining the cost-effectiveness of a noise barrier (regardless of whether the residence approached or exceeded the residential NAC). Under UDOT's policy, a benefiting residence is one that gets a noise reduction of 5 dBA or more as a result of the noise barrier. The maximum cost used to determine the reasonableness of a noise-abatement measure is $25,000 per benefiting residence based on a barrier cost of $15 per square foot (Chaney 2006).
- **Public Involvement and Balloting of Residents.** The UDOT Project Manager, Public Involvement Coordinator, and Environmental Engineer/Manager will decide on the appropriate level of public involvement for the MVC. The purpose of the public involvement process is to ensure that the concerns of the affected communities are known and that every effort to provide noise abatement to an affected community is made.

  In order to determine whether affected residents want noise-abatement measures to be implemented, UDOT will conduct a survey of residents before building any noise-abatement measures. To conduct the survey, UDOT will send a ballot to the current owner of record for each

residence that is determined to be affected by noise. Each ballot will be marked with the deadline by which the ballot must be returned. UDOT will send these ballots by regular mail and will consider this "due diligence" in notifying the affected residents of possible noise-abatement measures in their area.

UDOT will consider a noise-abatement measure only if the following percentages of residents vote by ballot in favor of the abatement measure:

- At least 75% of the residents who live in front-row residences (those adjacent to the alignment) that are affected by noise from the MVC, *and*
- At least 67% of the residents (including those in the front-row residences) who would receive at least 5 dBA of noise reduction from the noise-abatement measure

If the MVC project is being constructed more than 5 years after the Environmental Impact Statement is approved, UDOT will complete and document an evaluation to determine whether the ownership of the affected residences has changed significantly since the initial survey was conducted. If the ownership of affected residences has changed significantly, UDOT will conduct a new survey of the affected residents during the initial design phase for each phase of the MVC project. For the purpose of this survey, if at least 25% of the affected properties have changed ownership, this will be considered a significant change in ownership.

If the affected residents or property owners vote to reject construction of a noise-abatement measure, their area will not be reconsidered for future noise abatement unless a future transportation project is constructed in the area that meets the guidelines of a Type I project for noise abatement.

Because of the rapid growth in the MVC study area and the potential change in property ownership, UDOT will hold public involvement activities and balloting during the final design phase of the selected alternative.

- **Abatement Design.** A noise-abatement measure must be designed with the following considerations in mind: (1) good design practice, (2) optimal performance, and (3) current highway safety technology. UDOT will consider aesthetics treatment, graffiti deterrence, and landscaping where appropriate in relation to design standard specifications, cost efficiency, maintenance, and local municipality regulations.

Once UDOT has determined that a noise barrier is feasible, UDOT will determine whether its construction is reasonable by thoroughly considering the range of factors described above, including the cost-effectiveness of the measure. UDOT will construct noise barriers only if they have been determined to be both feasible and reasonable. The decision to recommend or not recommend a noise barrier is the responsibility of the UDOT Environmental Engineer/Manager with concurrence from the Project Manager and the Preconstruction Engineer. Final approval for projects with federal involvement will be made by FHWA.

This section describes the general process that UDOT follows to make recommendations for considering noise-abatement measures. Because of ongoing development in the MVC study area, it is likely that additional developments and residences will qualify for consideration of noise-abatement measures when the MVC is actually constructed. In addition, it is likely that some of the abatement measures described below that are not feasible or reasonable today might be feasible in the future due to increased development or because UDOT increased the allowance of $25,000 per benefiting residence. For these reasons, the final recommendations concerning noise-abatement measures will be determined during the final design phase for each phase of the project.

27.10.3 Noise-Abatement Methodology for the Mountain View Corridor

The effectiveness of noise barriers is generally limited to areas within about 500 feet of the proposed right-of-way. Beyond this distance, noise barriers do not effectively reduce noise levels at individual residences. In addition, differences in terrain and elevation between the roadway and the nearby residences can reduce the effectiveness of noise barriers. The noise-abatement analysis discussed below was limited to those areas adjacent to each segment of the alignment where there were clustered residences that would potentially benefit from a noise barrier (that is, achieve at least a 5-dBA reduction in project-related noise levels) and would meet the UDOT cost-effectiveness criterion.

Twenty-three noise barriers were considered, and the results of the evaluation are summarized below. Table 13A-1 through Table 13A-23 in Appendix 13A, Barrier Mitigation Tables, show the abatement evaluation for each noise barrier that was considered. In addition, the locations of potential noise barriers are shown in Figures 13-1 through Figure 13-24, Noise Analysis.

For each barrier considered, the feasibility and reasonableness of barrier heights between 12 feet and 20 feet were evaluated to determine the following results:

- The number of benefiting residences (those receiving a 5-dBA noise reduction, regardless of whether they approached or exceeded the residential NAC)
- The maximum noise level reduction from the barrier (which determines whether the noise barrier would achieve the 10-dBA reduction goal established by UDOT's Noise Policy)
- Whether a majority of first-row residences would benefit from the barrier
- The cost-effectiveness of the barrier (cost per benefiting residence)
- An overall determination of whether the barrier is both feasible and reasonable (cost-effective)

27.10.4 Noise-Abatement Measures for the Salt Lake County Alternatives

27.10.4.1 5800 West Freeway Alternative

5800 West Freeway Alternative – Segment 1 (I-80 to SR 201)

The area between I-80 and SR 201 is mostly undeveloped with no established residential developments. Therefore, noise-abatement measures were not considered in Segment 1.

5800 West Freeway Alternative – Segment 2 (SR 201 to 3500 South)

Two noise barriers were evaluated in Segment 2 (see Figure 13-2, Noise Analysis – 5800 West – SR 201 to 3500 South).

Barrier 1 (about 1,000 feet long) was located on the east side of the alignment just south of Parkway Boulevard. Barrier 1 was not feasible because a 5-dBA reduction in noise levels could not be achieved at the majority of first-row residences.

Barrier 2 (about 4,000 feet long) was located on the west side of the alignment from about 2920 South to 3500 South. A noise barrier between 15 feet and 19 feet high would provide up to 8 dBA of noise reduction to the majority of first-row residences and would benefit about 148 to 155 residences. Barrier 2 would be feasible and reasonable according to UDOT's noise-abatement criteria.

5800 West Freeway Alternative – Segment 3 (3500 South to 4100 South)

Two noise barriers were evaluated in Segment 3 (see Figure 13-3, Noise Analysis – 5800 West – 3500 South to 4100 South).

Barrier 3 (about 4,475 feet long) was located on the east side of the proposed 5800 West alignment through a residential development from 3500 South to just north of 4100 South. A barrier 15 feet to 19 feet high would provide up to 8 dBA of noise reduction at the majority of first-row residences and would benefit more than 100 residences. Barrier 3 would be feasible and reasonable according to UDOT's noise-abatement criteria.

Barrier 4 (about 2,500 feet long) was located on the west side of the alignment from south of 3500 South to the open-space area north of 4100 South. A barrier between 15 feet and 19 feet high would provide from 7 dBA to 10 dBA of noise reduction (depending on the barrier height) to the majority of first-row residences. Barrier 4 would benefit more than 50 residences and would be feasible and reasonable according to UDOT's noise-abatement criteria.

5800 West Freeway Alternative – Segment 4 (4100 South to 5400 South)

Two noise barriers were evaluated in Segment 4 (see Figure 13-4, Noise Analysis – 5800 West – 4100 South to 5400 South).

Barrier 5 (about 2,000 feet long) was located on the west side of the alignment just north of 4300 South to south and west of the Denver & Rio Grande Railroad alignment. Noise barriers that are 15 feet and 17 feet high would be feasible (would provide 5 dBA of noise reduction) but would not meet the reasonableness criterion of UDOT's noise-abatement policy because the barriers would not benefit enough residences to meet the cost-effectiveness criterion. A 19-foot-high barrier would provide up 10 dBA of noise reduction at the majority of first-row residences and would benefit about 25 residences. A 19-foot-high barrier would be both feasible and reasonable according to UDOT's noise-abatement criteria.

Barrier 6 (about 2,500 feet long) was located on the east side of the alignment from about 4300 South to south and west of the Denver & Rio Grande Railroad alignment. Barrier heights between 15 feet and 19 feet high were feasible (would provide 5 dBA of noise reduction) but did not benefit enough residences to meet the cost-effectiveness criterion of UDOT's noise-abatement policy. If UDOT's allowable cost per benefiting residence (currently $25,000) is increased in the future, it is possible that a noise barrier at this location would be cost-effective.

5800 West Freeway Alternative – Segment 5 (5400 South to 7800 South)

Two noise barriers were evaluated in Segment 5 (see Figure 13-5, Noise Analysis – 5800 West – 5400 South to 7800 South).

Barrier 7 (about 2,000 feet long) was located on the east side of the alignment from just north of Borax Avenue to just north of 6200 South. A noise barrier between 15 feet and 19 feet high would provide up to 7 dBA of noise reduction to the majority of first-row residences. Barrier 7 would benefit about 35 to 44 residences depending on the barrier height and would be feasible and reasonable according to UDOT's noise-abatement criteria.

Barrier 8 (about 4,500 feet long) was located on the east side of the alignment between about 6200 South and 7000 South. Noise barriers that are between 15 feet and 17 feet high would not provide 5 dBA of noise reduction at the first-row residences and, therefore, would not be feasible under UDOT's feasibility criterion. A 19-foot-high noise barrier would provide 7 dBA of noise reduction to the majority of first-row residences and would benefit about 61 residences. A 19-foot-high noise barrier at this location would be feasible and reasonable according to UDOT's noise-abatement criteria.

5800 West Freeway Alternative – Segment 6 (7800 South to Old Bingham Highway)

One noise barrier was evaluated in Segment 6 (see Figure 13-6, Noise Analysis – 5800 West – 7800 South to Old Bingham Highway).

Barrier 9 (about 2,500 feet long) was located on the east side of the alignment from about 8200 South to just north of the New Bingham Highway. Barriers between 17 feet and 19 feet high would provide up to 6 dBA of noise reduction to the majority of first-row residences and would benefit about 32 residences. Noise barriers that are between 17 feet and 19 feet high would be feasible and reasonable according to UDOT's noise-abatement criteria.

5800 West Freeway Alternative – Segment 7 (Old Bingham Highway to 11800 South)

One noise barrier was evaluated in Segment 7 (see Figure 13-7, Noise Analysis – 5800 West – Old Bingham Highway to 11800 South).

Barrier 10 was located on the west side of the alignment north of 11800 South. Because the existing residential development is located more than 500 feet away from the proposed alignment, 5 dBA of noise reduction could not be achieved at the majority of first-row residences. Therefore, a noise barrier would not be

feasible according to UDOT's noise-abatement criteria. In the future, if additional residential development takes place closer to the roadway, then a noise barrier might be feasible at this location.

5800 West Freeway Alternative – Segment 8 (11800 South to 13400 South)

Three noise barriers were evaluated in Segment 8 (see Figure 13-8, Noise Analysis – 5800 West – 11800 South to 13400 South).

Barrier 11 (about 3,500 feet long) was located on the east side of the alignment between about 11800 South and 12600 South. A noise barrier between 15 feet and 19 feet high would provide up to 8 dBA of noise reduction to the majority of first-row residences and would benefit about 49 to 61 residences. Barrier 11 would be feasible and reasonable according to UDOT's noise-abatement criteria.

Barrier 12 (about 3,000 feet long) was located on the west side of the alignment south of 12600 South. A noise barrier 17 feet to 19 feet high would provide up to 9 dBA of noise reduction to the majority of first-row residences and would benefit about 48 to 75 residences. Barrier 12 would be feasible and reasonable according to UDOT's noise-abatement criteria.

Barrier 13 (about 1,500 feet long) was located on the east side of the alignment south of 12600 South. A noise barrier between 15 feet and 19 feet high would provide up to 11 dBA of noise reduction to the majority of first-row residences and would benefit about 17 to 21 residences. Barrier 13 would be feasible and reasonable according to UDOT's noise-abatement criteria.

5800 West Freeway Alternative – Segment 9 (13400 South to Utah County)

One noise barrier was evaluated in Segment 9 (see Figure 13-9, Noise Analysis – 5800 West – 13400 South to Utah County).

Barrier 14 (about 2,500 feet long) was located on the west side of the alignment south of 13400 South. Noise barriers between 15 feet and 19 feet high were modeled but would not provide the minimum required 5 dBA of noise reduction to the majority of first-row residences because of differences in terrain between the alignment and the residential development. As a result, Barrier 14 would not be feasible according to UDOT's noise-abatement criteria. During the final design phase of the project, noise barriers will be re-evaluated at this location to determine if conditions have changed enough (for example, additional residential development, roadway design changes, and so on) that a noise barrier would be reasonable and feasible.

27.10.4.2 7200 West Freeway Alternative

7200 West Freeway Alternative – Segment 10 (I-80 to SR 201)

The area between I-80 and SR 201 on the 7200 West alignment is mostly undeveloped with no established residential developments (see Figure 13-10, Noise Analysis – 7200 West – I-80 to SR 201). Therefore, noise barriers were not considered in Segment 10.

7200 West Freeway Alternative – Segment 11 (SR 201 to 3500 South)

Six noise barriers were evaluated in Segment 11 (see Figure 13-11, Noise Analysis – 7200 West – SR 201 to 3500 South).

Barrier 15 (about 2,500 feet long) was located on the east side of the alignment between the SR 201 interchange and a point just north of Parkway Boulevard. A noise barrier between 15 feet and 19 feet high would provide up to 11 dBA of noise reduction to the majority of first-row residences. Barrier 15 would benefit at least 61 residences and would be feasible and reasonable according to UDOT's noise-abatement criteria.

Barrier 16 (about 2,000 feet long) was located on the east side of the alignment between Parkway Boulevard and 3100 South. A noise barrier between 15 feet and 19 feet high would provide up to 7 dBA of noise reduction to the majority of first-row residences and would benefit about 35 residences. Barrier 16 would be feasible and reasonable according to UDOT's noise-abatement criteria.

Barrier 17 (about 2,000 feet long) was located on the east side of the alignment from south of 3100 South to near 3500 South. Noise barriers between 15 feet and 19 feet high would be feasible (would provide at least 5 dBA of noise reduction to first-row residences) but would benefit only about 11 residences. Barrier 17 would not be reasonable (that is, cost-effective) according to UDOT's noise-abatement criteria. If additional residential development takes place closer to the roadway, then a noise barrier might be feasible at this location. During the final design phase of the project, a noise barrier will be re-evaluated to determine if conditions have changed enough that a noise barrier would be reasonable and feasible.

Barrier 18 (about 2,000 feet long) was located on the west side of the alignment just north of Parkway Boulevard. Noise barriers between 15 feet and 19 feet high were modeled but would not provide the minimum 5 dBA of noise reduction to the majority of first-row residences. Barrier 18 would not be feasible according to UDOT's noise-abatement criteria.

Barrier 19 (about 2,500 feet long) was located on the west side of the alignment between Parkway Boulevard and 3100 South. Noise barriers between 15 feet and 19 feet high would provide up to 9 dBA of noise reduction to the majority of first-row residences and would be feasible. Noise barriers 15 feet to 17 feet high would meet UDOT's reasonableness criterion, but a 19-foot-high barrier would not benefit enough residences to justify its cost. As a result, a noise barrier 15 feet to 17 feet high at this location would be feasible and reasonable according to UDOT's noise-abatement criteria.

Barrier 20 (about 2,500 feet long) was located on the west side of the alignment between 3100 South and 3500 South. Noise barriers between 15 feet and 19 feet high would provide up to 9 dBA of noise reduction at a majority of the first-row residences. Barrier 20 would benefit about 80 residences and would be feasible and reasonable according to UDOT's noise-abatement criteria.

7200 West Freeway Alternative – Segment 12 (3500 South to 4100 South)

Three noise barriers were evaluated in the residential neighborhoods in Segment 12 (see Figure 13-12, Noise Analysis – 7200 West – 3500 South to 4100 South).

Barrier 21 (about 3,500 feet long), which would consist of two sections as shown in Figure 13-12, was located on the west side of the alignment between about Jefferson Road and 4100 South. A noise barrier between 15 feet and 19 feet high would provide up to 8 dBA of noise reduction to the majority of first-row residences. Barrier 21 would benefit about 130 residences and would be feasible and reasonable according to UDOT's noise-abatement criteria. Parallel barriers can increase noise levels by about 3 dBA because noise is reflected between the two sections of the barrier. The actual performance of this barrier will be determined during the final design phase of the project.

Barrier 22 (about 2,500 feet long) was located on the east side of the alignment between about Bello Avenue and 3800 South. A noise barrier between 15 feet and 19 feet high would provide up to 8 dBA of noise reduction to the majority of first-row residences and would benefit about 67 residences. Barrier 22 would be feasible and reasonable according to UDOT's noise-abatement criteria.

Barrier 23 (about 3,000 feet long) was located on the west side of the alignment between about 3800 South and 4100 South. A noise barrier between 15 feet and 19 feet high would provide up to 7 dBA of noise reduction to the majority of first-row residences. Barrier 23 would benefit about 80 residences and would be feasible and reasonable according to UDOT's noise-abatement criteria.

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7200 West Freeway Alternative – Segment 13 (4100 South to 5400 South)

Segment 8 is mostly undeveloped with few residential developments within 500 feet of the proposed alignment (see Figure 13-13, Noise Analysis – 7200 West – 4100 South to 5400 South). Because there are no substantial residential developments near the proposed alignment, noise barriers were not considered in this segment.

7200 West Freeway Alternative – Segment 14 (5400 South to Utah County)

The noise-abatement measures from 5400 South to the Utah County line for the 7200 West Freeway Alternative would be the same as those for Segment 5 through Segment 9 for the 5800 West Freeway Alternative (see Figure 13-5 through Figure 13-9, Noise Analysis – 5800 West).

27.10.5 Noise-Abatement Measures for the Utah County Alternatives

27.10.5.1 Southern Freeway Alternative

Southern Freeway Alternative – Segment 1 (Utah County Line to 2100 North)

There is very little residential development within 500 feet of the proposed alignment in this segment (see Figure 13-14 and Figure 13-15, Noise Analysis – Southern Freeway). Therefore, noise barriers were not considered in this segment.

Southern Freeway Alternative – Segment 2 (2100 North to SR 73/ Main Street/10800 West)

One noise barrier was evaluated in Segment 2 (see Figure 13-16, Noise Analysis – Southern Freeway – 3 of 4).

Barrier 1 (about 3,000 feet long) was located on the west side of the alignment just south of SR 73. A noise barrier 12 feet to 20 feet high was modeled at this location but was not feasible because the barrier would not benefit enough residences to meet UDOT's cost-effectiveness criterion (see Table 13A-1, Mitigation Analysis: Barrier 1, in Appendix 13A, Barrier Mitigation Tables). If additional residential development takes place closer to the roadway, then a noise barrier might be feasible at this location. During the final design phase of the project, a noise barrier will be re-evaluated to determine if conditions have changed enough that a noise barrier would be reasonable and feasible.

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Southern Freeway Alternative – Segment 3 (SR 73/Main Street/ 10800 West to I-15)

Two noise barriers were evaluated in Segment 3 (see Figure 13-16 and Figure 13-17, Noise Analysis – Southern Freeway).

Barrier 2 (about 4,500 feet long) was located on the south side of the alignment between about 8700 West and 8000 West. A noise barrier between 12 feet and 20 feet high would provide up to 13 dBA of noise reduction to the majority of first-row residences and would benefit about 79 to 82 residences depending on the height of the barrier. Barrier 2 would be feasible and reasonable according to UDOT's noise-abatement criteria.

Barrier 3 (about 2,150 feet long) was located on the north side of the alignment adjacent to a relatively new residential development just west of 7320 West. A noise barrier 12 feet to 20 feet high was modeled at this location but was not feasible because the barrier would not benefit enough residences to meet UDOT's cost-effectiveness criterion. If additional residential development takes place closer to the roadway, then a noise barrier might become feasible at this location.

27.10.5.2 2100 North Freeway Alternative

Three noise barriers were evaluated along the 2100 North Freeway alignment.

Barrier 4 (about 2,000 feet long) was located on the south side of the alignment between about 2300 West and 1900 West near the Union Pacific Railroad tracks (see Figure 13-19, Noise Analysis – 2100 North Freeway – 2 of 3). A noise barrier 12 feet to 20 feet high was modeled at this location but was not feasible because the barrier would not benefit enough residences to meet UDOT's cost-effectiveness criterion. If additional residential development takes place closer to the roadway (or if UDOT's cost allowance is increased), then a noise barrier might be feasible at this location.

Barrier 5 (about 2,500 feet long) was located on the north side of the alignment in the same general location as Barrier 4. A noise barrier between 12 feet and 20 feet high was modeled at this location and would provide up to 11 dBA of noise reduction to the majority of first-row residences. Depending on the barrier height, a barrier at this location would benefit about 38 to 64 individual residences. Barrier 5 would be feasible and reasonable according to UDOT's noise-abatement criteria.

Barrier 6 (about 1,265 feet long) was located east of the Union Pacific Railroad tracks on the south side of the alignment near the tie-in to I-15. A noise barrier between 12 feet and 20 feet high was modeled at this location and would provide

up to 10 dBA of noise reduction to the majority of first-row residences. Depending on the barrier height, a barrier at this location would benefit about 22 to 26 residences. Barrier 6 would be feasible and reasonable according to UDOT's noise-abatement criteria.

27.10.5.3 Arterials Alternative

Arterials Alternative – Segment 1 (Utah County Line to 2100 North)

In Segment 1, there is very little residential development within 500 feet of the proposed alignment (see Figure 13-21, Noise Analysis – Arterials – 1 of 4). Therefore, noise barriers were not considered in this segment.

Arterials Alternative – Segment 2 (2100 North to SR 73)

In Segment 2, there is very little residential development within 500 feet of the proposed alignment (see Figure 13-22, Noise Analysis – Arterials – 2 of 4). Therefore, noise barriers were not considered in this segment.

Arterials Alternative – Segment 3 (SR 73/Main Street/10800 West to 8000 West)

Two noise barriers were evaluated in Segment 3.

Barrier 7 (about 4,500 feet long) was located on the south side of the alignment between about 8700 West and 8000 West (see Figure 13-23, Noise Analysis – Arterials – 3 of 4). A noise barrier between 12 feet and 20 feet high would provide up to 13 dBA of noise reduction to the majority of first-row residences and would benefit about 76 to 85 residences depending on the barrier height. Barrier 7 would be feasible and reasonable according to UDOT's noise-abatement criteria.

Barrier 8 (about 2,150 feet long) was located on the north side of the alignment adjacent to a relatively new residential development just west of 7320 West (see Figure 13-23). A noise barrier 12 feet to 20 feet high was modeled at this location but was not feasible because the barrier would not benefit enough residences to meet UDOT's cost-effectiveness criterion. If additional residential development takes place closer to the roadway (or if UDOT's cost allowance is increased), then a noise barrier might be feasible at this location.

Arterials Alternative – Segment 4 (8000 West to 7320 West)

The area between 8000 West and 7320 West is relatively undeveloped. Therefore, noise barriers were not considered in Segment 4.

Arterials Alternative – Segment 5 (7320 West to I-15)

The area between 7320 West and I-15 is relatively undeveloped. Therefore, noise barriers were not considered in Segment 5.

Arterials Alternative – Segment 6 (2100 North Arterial)

Three noise barriers were evaluated in Segment 6 (see Figure 13-22, Noise Analysis – Arterials – 2 of 4).

Barrier 9 (about 2,000 feet long) was located on the south side of the alignment between about 2300 West and 1900 West near the Union Pacific Railroad tracks. A noise barrier 12 feet to 20 feet high was modeled at this location but was not feasible because the barrier would not reduce noise by at least 5 dBA at the majority of first-row residences.

Barrier 10 (about 2,500 feet long) was located on the north side of the alignment in the same general location as Barrier 9. A noise barrier between 12 feet and 20 feet high was modeled at this location and would provide up to 11 dBA of noise reduction to the majority of first-row residences depending on the barrier height. Barrier 10 would benefit about 34 to 60 residences depending on the barrier height. A noise barrier at this location would be feasible and reasonable according to UDOT's noise-abatement criteria.

Barrier 11 (about 1,265 feet long) was located east of the Union Pacific Railroad tracks on the south side of the alignment near the tie-in to I-15. A noise barrier between 12 feet and 20 feet high was modeled at this location and would provide up to 10 dBA of noise reduction to the majority of first-row residences. Depending on the barrier height, a barrier at this location would benefit about 20 to 38 residences. Barrier 11 would be feasible and reasonable according to UDOT's noise-abatement criteria.

27.11 Mitigation Measures for Water Quality Impacts

This section discusses mitigation measures associated with water quality, stream crossings, culvert design, and erosion protection for the permanent roadway. Mitigation measures were determined by consulting with the water quality agencies that are familiar with the impact analysis area.

27.11.1 Surface Water Quality

The following mitigation measures were specifically mentioned by UDEQ. These measures are intended to reduce erosion and apply to all areas along the project that are proposed for construction. In addition to these measures, where

appropriate, UDOT's Utah Pollutant Discharge Elimination System Phase II manual will be used.

- **Cut-and-Fill Slopes.** Provide erosion control on all cut-and-fill slopes by applying compost or mulch to the slope or through other means. Establish native vegetation on the slope where possible. Where possible, provide vegetated filter strips. Vegetated filter strips are UDEQ's preferred water quality treatment measures for the impact analysis area. Vegetation in filter strips slows the velocity of the stormwater enough that larger suspended particles settle out, metals can be taken up by the organic material in the soil, and the dissolved metal cations can be exchanged in the clay minerals in the soils or removed by the vegetation. The reduction in velocity also allows more time for oil and grease to volatilize, photodegrade, biodegrade, or be taken up by organic components in the vegetation or soils.
- **Detention Ponds.** Detention ponds will be provided for water quality treatment where it is necessary to detain runoff to reduce its peak flow rate. The proposed detention pond locations are shown in Figure 14-8 through Figure 14-13, Proposed Detention Pond Locations.

  In addition to reducing peaks and velocities in streams, detention ponds have the added benefit of reducing the levels of TSS, TDS, and metals in highway runoff. The benefits of detention ponds were assumed in the numeric analyses for Barney's Creek, the American Fork River, and the Jordan River (see Table 14.4-7, Table 14.4-10, and Table 14.4-11).

27.11.2 Groundwater Flow

In areas of shallow groundwater, the proposed roadway embankments could compact the underlying soils and alter the groundwater flow. During the final design phase of the project, more detailed geotechnical evaluation and analysis will be required. At that time, UDOT will determine the impacts to the groundwater level from embankment fill, as well as appropriate mitigation measures. If groundwater is drawn to the surface by the project, flow toward Utah Lake will be maintained by equalization culverts or other surface water conveyance structures. If UDOT determines that the embankments would alter subsurface water elevations, groundwater flow will be maintained by one or more of the following methods: culvert, series of culverts, French drain, corrugated strip drain, synthetic drainage net, gravel layer, or other groundwater conveyance structures. Design and construction of groundwater conveyance structures, where necessary, will minimize the potential for changes to groundwater levels and flow patterns.

27.11.3 Groundwater Wells

If a well needs to be relocated, UDOT will purchase the water right or the land associated with the right or negotiate an agreement with the water right owner to replace the well. Impacts to groundwater caused by encroaching on wells and drinking water source protection zones are unlikely to require a permit by the Utah Division of Water Quality (Herbert 2004).

Affected wells will be abandoned by a licensed well driller in accordance with Utah Administrative Code Section 655-4-12. The driller must contact the State Engineer and provide an abandonment log when the closure is completed. Neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout will be used to abandon wells and boreholes (UAC R655-4).

27.12 Mitigation Measures for Ecosystem Impacts

27.12.1 Wildlife and Wildlife Habitat

27.12.1.1 Wildlife Crossings

As part of improvements to Redwood Road from Bangerter Highway in Salt Lake County south to Saratoga Springs, UDOT has proposed wildlife crossings. Redwood Road parallels the MVC alternatives and therefore the MVC project would include wildlife crossings in the same locations as the Redwood Road project. The crossings include one north of Camp Williams at MP 38 and two on Camp Williams (MP 36.5 and MP 35.4). The proposed crossing location at MP 36.5 would occur at Beef Hollow, which the MVC project would span with a bridge. The other crossing types would be similar to those proposed for Redwood Road by including fencing with escape ramps and an underpass with fencing to funnel the wildlife to the crossing location.

In addition to wildlife crossings, UDWR recommended that wildlife fencing with escape ramps should be installed along the Salt Lake County alignment south of 12600 South from Riverton to Camp Williams. Additional analysis of the wildlife fencing will be conducted during the final design phase of the project in coordination with UDWR and USFWS.

Rivers and creeks in the MVC study area such as the Jordan River, Spring Creek, American Fork Creek, and Dry Creek will be spanned so that the water course will not be altered and no fish habitat will be affected.

27.12.1.2 Vegetation

Temporary impacts to vegetation will be mitigated immediately after construction to prevent further, permanent effects. Mitigation could include any of the following measures:

- Compacted soils will be ripped, stabilized, and reseeded with native seed mixes.
- Weed-control practices and monitoring will accompany revegetation efforts until the native plant communities are successfully re-established.
- The contractor will be required to follow noxious weed mitigation and control measures identified in the most recent version of UDOT's Special Provision Section 02924S, Invasive Weed Control.
- Strictly following Best Management Practices (BMPs) will also reduce the potential for weed infestations.
- Reseeding with native plants, followed by monitoring seedlings and invasive species until the vegetation has re-established, will mitigate direct-disturbance impacts and reduce the potential for weed invasions. UDOT will be responsible for monitoring and determining when vegetation becomes re-established.

Direct impacts to nesting migratory birds and other bird species in appropriate habitat near the playa wetlands in Salt Lake County and in Utah County can be avoided by clearing vegetation between September and February, outside of most birds' breeding, nesting, and brood-rearing season. When it is not possible to clear vegetation from construction sites during this period, a biologist will be onsite during vegetation clearing. If any vegetation is cleared along the project corridor from March through August, UDOT or the construction contractor might be required to obtain authorization from USFWS to relocate and potentially take migratory birds. If nesting migratory birds are found during clearing, construction will be stopped by the biologist until authorization is obtained from USFWS.

27.12.1.3 Water Quality

The following mitigation measures were specifically mentioned by the Utah Department of Environmental Quality (UDEQ). These measures are intended to reduce erosion and apply to all areas along the project that are proposed for construction. In addition to these measures, where appropriate, UDOT's Utah Pollutant Discharge Elimination System Phase II manual will be used.

- **Cut-and-Fill Slopes.** Provide erosion control on all cut-and-fill slopes by applying compost or mulch to the slope or through other means. Establish native vegetation on the slope where possible. Where possible, provide vegetated filter strips. Vegetated filter strips are UDEQ's preferred water quality treatment measures for the impact analysis area. Vegetation in filter strips slows the velocity of the stormwater enough that larger suspended particles settle out, metals can be taken up by the organic material in the soil, and the dissolved metal cations can be exchanged in the clay minerals in the soils or removed by the vegetation. The reduction in velocity also allows more time for oil and grease to volatilize, photodegrade, biodegrade, or be taken up by organic components in the vegetation or soils.

- **Detention Ponds.** Detention ponds will be provided for water quality treatment where it is necessary to detain runoff to reduce its peak flow rate. The proposed detention pond locations are shown in Figure 14-8 through Figure 14-13, Proposed Detention Pond Locations.

  In addition to reducing peaks and velocities in streams, detention ponds have the added benefit of reducing the levels of TSS, total dissolved solids (TDS), and metals in highway runoff.

BMPs will be implemented during roadway construction under the action alternatives. FHWA and UDOT will use a number of BMPs to ensure that wetland/riparian areas are protected from adjacent sediment sources (such as adjacent cut-and-fill activities). The BMPs that will be used to curb soil erosion could include, but are not limited to, the following:

- Silt fencing
- Straw bales or sediment logs
- Geo-fabric (erosion control matting)
- Check dams
- Seeding
- Mulching
- Contour scarification

- Contour strip seeding
- Contour berming
- Pads for construction equipment (to be used in wetland areas)

Additionally, bank stabilization will likely be needed where construction activities overlap with the riparian area. Banks will be stabilized through the use of gabions and/or streambank willow plantings. The Utah Division of Water Quality recommends the use of vegetative or bioengineered materials rather than riprap to control erosion whenever possible.

After construction, wetland/riparian areas will be restored by FHWA and UDOT or a qualified subcontractor. Seed mixes and plantings should reflect the native species that were present before the area was disturbed. The appropriate seed mixes and plantings will be prescribed on a site-specific basis by the agency land manager when applicable. USACE has recommended that the BMPs listed in the USFWS *Recommended Best Management Practices for Work in Utah Streams* (August 18, 2003) should be used as guidance when working near wetlands.

27.12.1.4 Roadway Maintenance

A large reduction in TDS can be achieved by following proper roadway maintenance procedures. As noted in Chapter 6 of the UDOT Stormwater Management Plan UPDES Phase II measures, pollution prevention and good housekeeping can prevent and reduce pollutants from being discharged to downstream waters. UDOT has standard operating procedures for roadway maintenance. Proper roadway maintenance BMPs are as follows:

- **Snow Removal and De-icing Practices.** Apply only the minimum quantity of de-icing agent necessary to remove ice from roadway facilities. Provide training to employees and document training efforts.
- **Salt Pile Storage.** Properly cover stockpiles of salt to prevent storm runoff from contacting the material and migrating to downstream drainage facilities and receiving waters.
- **Street Sweeping.** Remove particulates and debris from paved roadway surfaces. All state paved roadways in urbanized and rural areas will be swept at least once per year. Material collected will be properly disposed of at local landfills. Street-sweeping efforts help to remove fine particulate matter and other pollutants before being discharged into storm drain systems and downstream receiving waters.
- **Spill Prevention and Response Plan.** Implement an established set of policies and procedures to provide instruction and guidance in case of a hazardous material discharge or spill.

27.12.2 Wetlands

Before constructing the selected alternatives, UDOT will conduct a wetland delineation in compliance with Section 404 of the Clean Water Act. The total acreage of jurisdictional wetlands identified during this process and the results of the functional assessment will determine the type and amount of mitigation required to offset impacts to waters of the U.S. For example, mitigation could include creating new wetlands from uplands, restoring wetlands in areas that have become uplands, and enhancing and/or preserving existing wetlands. The typical acreage-based mitigation ratios for concurrent mitigation efforts of mitigated area to impact area used by USACE's Utah regulatory office for these activities are 2:1 for creation, 1.5:1 for restoration, 5:1 for enhancement, and 10:1 for preservation. These ratios have been determined based on the likelihood of success and compliance with the federal policy of "no net loss of wetlands." However, if a mitigation bank is developed before the wetland impacts occur, then these ratios could be different.

Using the results of the wetland functional assessment, mitigation ratios based on functional "lift" can be developed to modify these ratios. Functional lift refers to a measure of functional improvement that theoretically could be attained through mitigation by creation, restoration, or enhancement. It takes into account the functionality of a wetland as measured by the wetland assessment model in relationship to its size. For example, mitigating impacts to 10 acres of low-functioning wetlands might not require creating 20 acres of new wetlands if site selection and hydrology show the potential to create high-functioning wetlands. In this case, a function-based mitigation ratio for creation could be less than 2:1 given the increase in wetland function provided by the new wetlands relative to the 10 acres of affected, low-functioning wetlands.

These mitigation ratios are applied to a larger mitigation plan and associated Section 404 Individual Permit application. Typically, as part of a permit process, an applicant is required to conduct an alternatives analysis. Since all alternatives in this EIS are considered practicable, this EIS fulfills this requirement.

Further avoidance and minimization are also necessary as part of impact mitigation. The planning and design process for the MVC project avoided and minimized impacts to wetlands and waters of the U.S. by shifting the alignments and constructing retaining walls to the extent possible while complying with engineering specifications, such as minimum radius of curvature.

In addition to the MVC project, UDOT is planning for other projects in Salt Lake and Utah Counties that could affect wetlands and require mitigation. To mitigate these impacts, UDOT is investigating the possibility of developing a wetland mitigation bank that will cover the combined mitigation needs of these projects.

To identify locations for potential wetland mitigation banks, UDOT held a workshop on March 9, 2007. The purpose of the workshop and the associated report (UDOT 2007) was to identify some general locations that could be developed as wetland mitigation sites for project-related impacts.

To help identify the best locations for potential mitigation sites, UDOT invited resource agencies, university professors, and non-governmental organizations to a wetland identification workshop. The people who were invited to the meeting included both local and regional experts in wetland and biological resources and those interested in resource conservation. About 15 people attended the meeting, including representatives from the following organizations:

- The Nature Conservancy
- Utah Division of Wildlife Resources
- Utah Reclamation, Mitigation, and Conservation Commission
- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers
- Utah Department of Transportation
- Utah Transit Authority

The sites identified in the meeting are listed in Table 27.12-1 and Table 27.12-2 below and shown in Figure 15-23 and Figure 15-24, Potential Wetland Mitigation Areas. UDOT is currently looking at these sites for development of a wetland mitigation bank. UDOT plans to conduct a formal wetland delineation once FHWA makes a decision on a Preferred Alternative in Salt Lake and Utah Counties. Once UDOT conducts a formal wetland delineation for the MVC project, UDOT and USACE will perform a more detailed analysis to determine how much mitigation, and what type of mitigation, will be required. This wetland impact information will be considered when developing the UDOT wetland mitigation bank.

FHWA and UDOT will require the construction contractor to limit ground and wetland disturbance to the area necessary for the highway improvement. However, if the contractor disturbs more than the area required for improvement, the contractor will have to mitigate for the impact. To mitigate these temporary impacts associated with compacted soil, wetland areas will be ripped to break up any compacted layers. Where vegetation is disturbed or destroyed, the contractor will reseed these areas with a seed mix of native wetland plants approved by the appropriate agency. Additionally, the contractor will take steps to ensure that noxious weeds are not introduced into wetland plant communities. BMPs required by FHWA and UDOT will require that construction equipment entering the highway construction site be washed to remove noxious weed seeds.

Table 27.12-1. Potential Salt Lake County Wetland Mitigation Sites

Wetland Site Number and Name	Importance	Types of Wetland Mitigation	Comments
SLC 1 – Playa Wetlands South of I-80	High – Playa wetlands are difficult to create, so preservation and enhancement of these existing wetlands are important.	Preservation, enhancement, and restoration	This area is under development pressure. This area is next to the Utah Division of Wildlife Resources' Lee Kay Center for Hunter Education which, if combined with preservation of the playa wetland, would provide a large continuous block of protected land in Salt Lake County.
SLC 2 – Wasatch Stream Restoration	Low – A mitigation site at this location would restore flood attenuation, restore some wildlife habitat, and provide open space.	Enhancement and restoration	This site would include restoring some of the streams coming from the Wasatch Mountains. The area around the streams is heavily modified. Restoration could provide flood benefits and human open-space values. Streams include Big Cottonwood, Little Cottonwood, Bell's Canyon/ Dimple Dell, and Parley's Canyon.
SLC 3 – UDOT Jordan River Mitigation Site	Medium – A mitigation site at this location would allow continued expansion of a functioning wetland mitigation site on the Jordan River. The site provides flood value and habitat.	Enhancement and restoration	Building onto this existing site would create a larger functioning wetland complex, which would provide improved habitat values. The potential for success is high. Expanding the site would provide additional public open space.
SLC 4 – Special Area Management Plan	High – The area is under some development pressure. There are important playa wetlands along the Great Salt Lake.	Preservation and enhancement	The recommended conservation area was identified north of I-80 and south of the Great Salt Lake.
SLC 5 – Salt Lake City International Airport	Medium to High – A mitigation site at this location would improve altered hydrology, restore some wildlife habitat, and provide open space.	Preservation, enhancement, and restoration	UDOT would explore the opportunity to work with the Salt Lake City International Airport to provide a larger combined wetland area.

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Table 27.12-2. Potential Utah County Wetland Mitigation Sites

Wetland Site Number and Name	Importance	Types of Wetland Mitigation	Comments
UTC 1 – Utah Lake North Shore	High – The site was ranked number 1 by the group for wetland mitigation. Development pressure could result in loss of the wetlands. The area includes rare fen soils and the threatened Ute ladies'-tresses. This area is the least-protected of the areas around Utah Lake.	Preservation, enhancement, restoration, and creation	The site could include a combination of preservation along Utah Lake with restoration of Spring Creek and American Fork Creek. The City of American Fork has designated an area for preservation along Utah Lake that could be available for purchase. There is a potential to include upland habitat along the creeks. Additional sites in this area could include the Pleasant Grove spring complex near I-15. Removal of existing farm drainage features would help restore wetland habitat.
UTC 2 – Jordan River Corridor	Medium – Much of the natural habitat along the Jordan River has been affected by farming and urban development.	Enhancement and restoration	Building this site would expand the Lehi mitigation site along the Jordan River. Much of the land along the Jordan River is privately held as farmland, but there is a high potential for future urban development along the shoreline.
UTC 3 – Vineyard	Medium – This site contains important and rare Histosol soils and habitat for threatened Ute ladies'-tresses. USFWS commented that UTC 3 and UTC 4 should be considered as important to mitigate as UTC 5.	Enhancement and restoration	Histosols are low-density, acidic soils with a high proportion of organic material. The soils are formed mainly in cold climates and under waterlogged conditions. Removing fill over the Histosol soils can re-establish the wetlands with good results.
UTC 4 – Skipper Bay	Medium – This site contains important and rare Histosol soils and habitat for threatened Ute ladies'-tresses. USFWS commented that UTC 3 and UTC 4 should be considered as important to mitigate as UTC 5.	Preservation and restoration	This site includes the inland areas around the Orem Golf Course and the existing Kari Smith mitigation site managed by The Nature Conservancy. This site could potentially expand onto the Nature Conservancy site, which would provide a larger wetland block under protection. Other site characteristics are similar to those for UTC 3.
UTC 5 – Provo Bay	High – The site was ranked number 2 by the group for wetland mitigation.	Preservation and enhancement	
UTC 6 – Hobble/Dry Creek Unit	Medium – The area contains habitat for threatened Ute ladies'-tresses.	Preservation and enhancement	Building this site would expand onto an existing wetland mitigation site. This area includes a June Sucker Recovery Program area.

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Wetland Site Number and Name	Importance	Types of Wetland Mitigation	Comments
UTC 7 – Lincoln Beach	High – The site was ranked number 3 by the group for wetland mitigation. The area provides important wetland complexes and wildlife habitat values.	Preservation and restoration	This site could possibly include the restoration of Spanish Fork Creek as it enters Utah Lake.
UTC 8 – South Utah Lake Inland	Low – Some of the area is protected by two existing wetland mitigation sites. A high water table makes development difficult.	Preservation and enhancement	

27.13 Mitigation Measures for Floodplain Impacts

Measures will be taken to reduce floodplain impacts and to ensure that constructing the MVC complies with all applicable regulations. These measures include the following:

- The proposed alternatives would require a number of stream crossings. When hydraulic structures are designed, the design will follow the UDOT Manual of Instruction and FEMA requirements, where applicable, to determine the design flood to use for the design of all bridges and culverts necessary for these stream crossings. Where existing bridges or culverts are reused, their structural integrity and hydraulic capacity will be verified during the design phase of the project.
- Stream alteration permits will be obtained for all stream crossings. Floodplain development permits will be obtained for all locations where the proposed roadway would encroach on a regulatory floodplain, and structures will be designed to meet the more stringent of FEMA requirements and local floodplain ordinances. FEMA requires that construction within a floodway must not increase the base 100-year flood elevation. By meeting these requirements, the risk of upstream flooding will be reduced.
- Roadway elevations will be above adjacent floodplain elevations, where those elevations are defined, so that flooding will not interfere with a transportation facility needed for emergency vehicles or evacuation.
- In areas of longitudinal crossings such as near Utah Lake, floodplain equalization culverts or other surface water conveyance structures will be installed to allow flood waters to flow freely between the northern and southern sides of the Southern Freeway Alternative and the Arterials Alternative, 1900 South alignment. The conveyance structures will also be designed to maintained wetland hydrology if feasible. Furthermore, erosion-control measures will be implemented at these structure locations. These actions will reduce impacts to natural and beneficial floodplain values.

27.14 Mitigation Measures for Impacts to Historic, Archaeological, and Paleontological Resources

Mitigation measures are not yet developed. They will result from a Programmatic Agreement or Memorandum of Agreement that will be negotiated with the Utah SHPO prior to the Record of Decision for the project (see Section 17.2.1.4, Next Steps).

27.15 Mitigation Measures for Impacts to Hazardous Waste Sites

During the final design phase of the project, UDOT will coordinate with DERR (a division of the Utah Department of Environmental Quality) and/or EPA, the construction contractor, and the appropriate property owners. This coordination will involve determining the status of the sites of concern at the time of construction and identifying the nature and extent of remaining contamination (if any) to minimize the risk to all parties involved. The potential to affect newly discovered sites will be identified by reviewing DERR records. UDOT will determine the need for phase I environmental site assessments at suspect properties during the final design phase to further evaluate the potential for encountering hazardous materials within the right-of-way for any of the action alternatives. If the assessments determine that contamination is still present, the remedial measures will be determined based on the nature and extent of contamination through coordination with DERR and/or EPA.

Previously unidentified sites or contamination (such as buried drums, fuel USTs, or solvent USTs) could be encountered during construction. In such a case, all work will stop in the area of the contamination according to UDOT Standard Specifications, and the contractor will consult with UDOT and DERR to determine the appropriate remedial measures. Hazardous wastes will be handled according to UDOT Standard Specifications and the requirements and regulations of the Utah Department of Environmental Quality and EPA.

27.16 Mitigation Measures for Visual Impacts

During the preliminary design phase of the MVC project, depressing the roadway (below grade) was considered to reduce visual impacts. The final use of depressed sections will be evaluated during the final design phase after more detailed geotechnical and cost studies are performed. Additional aesthetic measures such as lighting; vegetation and plantings; the color of bridges,

structures, and retaining walls; and other architectural features such as railings would be considered during the final design phase of the project.

Landscaping and Lighting. The park-and-ride lots would be landscaped with native drought-tolerant vegetation to reduce water flow and to serve as an aesthetic enhancement. For all roadways, landscape plans for the roadway include replacement landscaping and median landscaping to reduce the impacts from the loss of vegetation. Directional lighting will be used where appropriate to reduce impacts to nearby residences.

27.17 Mitigation Measures for Energy Impacts

No mitigation measures would be required for energy use. However, several of the mitigation measures listed in Chapter 12, Air Quality (such as turning off construction equipment when not in use), would reduce construction-related energy consumption.

27.18 Mitigation Measures for Construction Impacts

27.18.1 Air Quality Mitigation

Air emission mitigation measures for construction will be developed as part of the Emission Control Plan submitted to the State of Utah. Mitigation measures will include the following:

- **Fugitive Dust Emission-Control Plan.** The contractor will be required to submit a fugitive dust emission-control plan to the Utah Department of Environmental Quality. The plan will outline project-specific activities for emission control and monitoring throughout construction in accordance with state and federal requirements. UDOT expects that strategies to control fugitive dust will include wetting excavation areas, unpaved parking and staging areas, and onsite stockpiles of debris, dirt, or dusty material; chemical stabilization; planting vegetative cover; providing synthetic cover and wind breaks; reducing construction equipment speed; covering loads; using conveyor systems; and washing haul trucks before leaving the loading site.
- **Street Sweeping.** The contractor will use street-sweeping equipment at paved site-access points.
- **Equipment Emissions.** The contractor will shut off construction equipment when it is not in direct use to reduce emissions from idling.

Other mitigation measures that could be implemented to minimize air quality impacts include the following:

- Use newer, cleaner-emitting construction equipment and properly maintain construction equipment.
- Install emission-control equipment on diesel construction equipment (such as particulate filters or traps, oxidizing soot filters, and oxidation catalysts) to the extent that is technically feasible.
- Reroute truck traffic away from schools and communities when possible.
- Evaluate the use of alternate engines and diesel fuels such as electric engines, engines that use liquefied or compressed natural gas, diesel engines that meet the U.S. Environmental Protection Agency's 2007 regulations, diesel engines fueled with low-sulfur fuel, and diesel engines outfitted with catalyzed diesel particulate filters and fueled with low-sulfur fuel (less than 15 parts per million sulfur).

27.18.2 Noise and Vibration Mitigation

Construction noise would be minimized by following UDOT's Standard Specifications for Environmental Protection and by complying with noise variances for the cities in which construction takes place. Construction noise would be minimized by the use of mufflers on construction equipment. Air compressors would meet federal noise level standards and would, if possible, be located away from or shielded from residences and other sensitive noise receptors. Other mitigation measures that could be used include constructing temporary noise barriers or curtains around equipment or work areas and equipping construction equipment engines with adequate mufflers and intake silencers.

The most appropriate method for reducing vibration from pile driving would be to use drilled shafts or auger cast piles in areas where vibration-sensitive buildings or utilities are located near the proposed foundation.

27.18.3 Visual and Light Mitigation

Impacts from lights used during nighttime construction will be minimized by aiming construction lights directly at the work area and/or shielding the lights to avoid disturbing nearby residences and mink farms.

27.18.4 Cultural Resources Mitigation

If cultural resources are discovered during construction, activities in the area of the discovery will immediately stop. The contractor will notify UDOT of the nature and exact location of the finding and will not damage or remove the resource. Work immediately adjacent to the discovery would be delayed until UDOT evaluates the extent and cultural significance of the site. The course of action and the construction delay would vary depending on the nature and location of the discovery. Construction would not resume until the contractor receives written authorization from UDOT to continue.

27.18.5 Vehicle, Pedestrian, Bicyclist, and Business Mitigation

The contractor will be required to develop a maintenance-of-traffic plan that defines measures to minimize construction impacts on traffic. A requirement of this plan will be that, to the extent possible, access to businesses and residences will be maintained and existing roads will be kept open to traffic unless alternate routes are provided. Signs will be placed to notify motorists that businesses are open and accessible during construction. The signs will also provide directions for accessing the businesses. Finally, information will be made available by phone and Internet detailing construction activities and providing alternate transportation routes.

Even with the implementation of the maintenance-of-traffic plan, short-term increases in traffic congestion would occur around the construction area. Street closures would be short-term and limited to the closures that are specified in the maintenance-of-traffic plan as approved by UDOT before the start of construction.

UDOT and the contractor will coordinate with emergency service providers such as police, fire protection, and ambulance service before construction to ensure that access for their vehicles will be maintained.

27.18.6 Utility Service Mitigation

The construction contractor will coordinate with all utility providers to minimize utility service interruptions. UDOT will coordinate with railroad companies to ensure that operations are not affected by construction. This mitigation could require the construction of temporary tracks in the area of construction.

27.18.7 Hazardous Materials Mitigation

If contamination is discovered during construction, mitigation will be coordinated according to UDOT Standard Specification 01355, Environmental Protection, which directs the contractor to stop work and notify the project engineer of the possible contamination. Any hazardous materials will be disposed of according to applicable state and federal guidelines.

27.19 Mitigation Measures for Indirect Effects

Neither the CEQ regulations nor FHWA's environmental guidance documents implementing NEPA specifically mention mitigation of indirect effects associated with highway projects. FHWA policy as stated in 23 CFR 771.105 discusses mitigation in Sections (d)(1) and (2) for adverse impacts that directly result from a project (not indirectly); this mitigation must represent a reasonable public expenditure.

The permitting requirements associated with Section 404(b)(1) guidelines governing the U.S. Army Corps of Engineers' permit are limited to requiring mitigation for indirect impacts that are quite specific and predictable in terms of location and degree. More generalized indirect impacts such as those associated with possible future growth in a region do not require mitigation.

The indirect impacts associated with building the project alternatives are difficult to predict and describe with any certainty or specificity. The evaluation process involves designating a study area (that is, the area subject to the project's influence such as the indirect effects analysis area); using forecasts of potential growth in population and employment, in this case based on projections from the Governor's Office of Planning and Budget, which do not address transportation improvements; interpreting how this growth will translate into potential future land use (largely based on interviews with land-use decision-makers and a review of master plans); and, lastly, predicting how the potential future land use could affect natural resources.

Note that the Growth Choices process was intended to integrate transportation and land-use planning so that transportation decisions support local land-use choices. This process should help avoid the need to mitigate the impacts of the MVC project on local land-use plans.

Due to the overall uncertainties (mainly because of the complexities involved), the results of the study of indirect effects are more informational and do not name specific areas or resources as requiring mitigation. The following sections

suggest various approaches to mitigating the indirect land-use effects from the MVC alternatives:

- Increase the density of development.
- Encourage transit-oriented development.
- Acquire open space and protect farmland.
- Promote regional planning.

To support implementation of these measures, UDOT would be willing to meet with the cities along the MVC project, major landowners, interested parties, and state legislators to discuss and review the Growth Choices Vision Scenario and provide a forum to discuss the relationship between land use and transportation.

27.19.1 Increase the Density of Development

Development issues have traditionally been addressed by the cities and counties through the administration of land-use regulations (zoning, site plan, and subdivision regulations), usually based on local master plans. The responsibility for mitigating the effects of ongoing growth, regardless of the project, rests largely with the local governments that have jurisdiction over land use as well as with the developers who are carrying out development projects. Nevertheless, UDOT could work with the affected municipalities to help implement the regional vision that resulted from the Envision Utah process. Potential measures to mitigate the effects of growth on the environment include the following:

- Revise local master plans to accommodate even higher densities than planned and to use less land.

Salt Lake City, for example, might consider very high-density office parks and employ transit-oriented development principles for its industrial park development. Locating the front doors of these commercial buildings near the proposed transit alternative and along new feeder bus routes would provide a shuttle service between the businesses and the transit station. In addition, transportation management associations could be organized to promote carpooling. This strategy can also increase transit ridership.

- Update zoning districts to increase densities near the project to include planned community-oriented developments.

This strategy would encourage mixed-use developments and planned communities, which have become permitable in some of the cities such as Lehi, Bluffdale, and South Jordan.

27.19.2 Encourage Transit-Oriented Development

As transit-oriented development in the MVC study area moves from concept to implementation, many decisions will need to be made so that future development occurs in a manner that supports transit. Transit-oriented development draws on many of the same planning and development principles embraced by New Urbanism, Smart Growth, and the Livable Communities movement:

- Moderate- to higher-density development compared to the existing pattern of development
- A mix of land uses
- Compact, pedestrian-oriented designs and streetscapes
- Building design and orientation to the street to allow easy pedestrian and transit access
- A fine-grained, connected street pattern without cul-de-sacs
- A system of parks and open spaces

In addition to these principles, for development to be transit-oriented, it generally needs to be shaped by transit in terms of parking, density, and/or building orientation in comparison to conventional development. Therefore, coordination with the Utah Transit Authority is critical as the transitway is expected to be funded in part by the Federal Transit Administration, which places a high priority on land use that supports transit. A successful transit-oriented development would reinforce the community and the transit system.

- Encourage transit-oriented developments where feasible.

27.19.3 Acquire Open Space and Protect Farmland

An open-space-acquisition program can help shape and restrict the area of development. Further, it can preserve areas for viewsheds (areas from which natural features are visible), a unique environmental asset of the western Salt Lake Valley. Just a slight rise in elevation provides views of the River Valley, Utah Lake, and the spectacular Wasatch and Oquirrh Mountains that define the edges of the Salt Lake and Utah Valleys. The West Jordan master plan, for example, intends to preserve stream beds as open-space links throughout the developing western half of the city.

Farmlands and grazing lands are another source of open space and could be protected from conversion for development, where appropriate and feasible. This rural feature can relieve the pattern of uninterrupted urban development and retain some of the historic uses in the Salt Lake Valley. Such an open-space acquisition plan can be accomplished by a partnership among the local, county, and state governments.

- Acquire open space and protect farmland.

27.19.4 Promote Regional Planning

The overall development pattern in the MVC study area is already well established, but it is not too late for the above strategies to be implemented. For best results, they should be coordinated with long-range regional and interjurisdictional planning so that the cumulative effects of individual and incremental land-use decisions can be better understood. (See Chapter 25, Cumulative Impacts, for a more specific discussion of the cumulative impacts of the many transportation projects that are planned for the region.) WFRC, MAG, and Envision Utah are already well-established regional organizations that foster this longer-range view. But implementation of long-range policies that can change the current low-density development pattern, such as those planning policies resulting from the Growth Choices effort, can be successful only if development approval decisions employ principles that are coordinated and consistent with a regional vision.

- Promote regional planning.

27.20 References

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